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ABSTRACT

Despite recent increased attention to Asperger's Syndrome (AS), few psychometric investigations of subjects have appeared and few studies have examined how clinicians and educators might better address the needs of this unique group of people. A diagnosis of AS according to the "Diagnostic and Statistical Manual of Mental Disorders" requires impairment of social interaction, repetitive and stereotyped patterns of behavior, but no clinically significant delay in language or cognitive development. This case report examines in detail the assessment of an inner-city adolescent black male with this syndrome and relates his difficulties to probable compromise of the right frontal (nondominant) lobe. Vocational recommendations were made for this student based on the assessment of his abilities and the recognition of his social limitations. Issues pertaining to future research and educational and vocational planning are discussed. More is known about autism than AS, and this is particularly true among the lower socioeconomic classes. Although AS is related to high functioning autism (HFA), more research is recommended on the practical, clinical implications of diagnosis of AS over HFA. (Contains 1 table, 1 figure, and 44 references.) (Author/SLD)

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Cognitive and Educational Aspects of Asperger's Syndrome in an Inner-City Adolescent Male

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ABSTRACT

Despite recent increased attention to Asperger's syndrome, few psychometric investigations of the subject have appeared and few studies have examined how clinicians and educators might better address the needs of this unique group of people. This case report examines in detail the assessment of an inner-city adolescent male with this syndrome and relates his difficulties to probable right frontal compromise. Issues pertaining to future research and educational and vocational planning are discussed.

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Introduction

Although Asperger's syndrome (AS) was described as early as 1944 (Asperger, 1944), it did not receive much attention until recently, largely due to Wing's (1981) comprehensive clinical account of the disorder. In fact, AS did not appear in the Diagnostic and Statistical Manual of Mental Disorders until its fourth edition (DSM-IV; American Psychiatric Association, 1994). Definitions of AS vary in the literature (Bishop, 1989; Pennington, 1991; Tantam, 1988; Wing, 1981). A DSM-IV diagnosis requires the following clinical presentation: impairment of social interaction; repetitive, stereotyped patterns of behavior, interest and activities; and no clinically significant general delay in language or cognitive development (American Psychiatric Association, 1994). Tantam (1988) adds that those with AS: 1) wish to socialize (as opposed to those with autism, who do not); 2) use language freely but cannot adjust to the needs of different social contexts; 3) inadequately express themselves nonverbally; and 4) are clumsy. The clumsiness issues related to AS are not yet resolved empirically, especially because lower IQ, often found in AS, also relates to clumsiness (Ghaziuddin, Butler, Tsai, & Ghaziuddin, 1994; Ghaziuddin, Tsai, & Ghaziuddin, 1992; Manjiviona & Prior, 1995).

AS resembles and in all likelihood closely epigenetically relates to high functioning autism (HFA) (Bishop, 1989;

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Pennington, 1991). The delineation between the two disorders remains a topic of ongoing debate (Bishop, 1989; Pennington, 1991; Pomeroy, Friedman, & Stephens, 1991; Szatmari, Tuff, Finlayson, & Bartolucci, 1990). The distinction remains important, as AS is generally associated with higher functioning and better prognosis than autism (McKelvey, Lambert, Mottron, & Shevell, 1995). For the time being, lack of knowledge regarding the core deficits of AS and HFA precludes precise delineation. In the DSM-IV account, at any rate, the two disorders differ mainly in the relatively normal language development found in AS (despite lowered pragmatic use of language). Literature comparing psychometric assessments on these two populations remains in the formative stages but has begun to address the distinction empirically. The neuropsychological underpinnings of the disorder as some type of right frontal compromise have become increasingly clear.

Brain Imaging Studies

The neuroanatomical underpinnings of the disorder are an area of increased focus. As discussed below, there is a tendency towards relatively lower Performance IQ in AS. In this regard, the disorder may lie on a continuum with non-verbal learning disorder, usually taken to imply non-dominant hemispheric weakness (Pennington, 1991; Semrud-Clikeman & Hynd, 1990; Volkmar et al., 1996). Broadly stated, the non-dominant hemisphere is

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more important to those skills tapped by the Performance IQ, while the dominant hemisphere is more important for those tapped by the Verbal IQ.

Several studies have in fact more directly studied brain asymmetry and abnormalities in AS with CT, MRI and SPECT instrumentation. McKelvey et al. (1995) for instance studied three AS subjects with all three methods. In each subject, results concorded with non-dominant cerebral hemisphere dysfunction. Patterns varied, but right frontal lobe dysfunction was apparent in each subject.

Volkmar et al. (1996) present an AS subject's MRI which revealed a wedge of missing tissue just superior to the ascending ramus of the sylvian fissure in both hemispheres, but somewhat larger on the right. Additionally, both right and left frontal lobes showed an aberrant pattern of gyri and sulci. The subject also displayed a large region of missing tissue in the left temporal lobe. The subject displayed greater nonverbal difficulties on the Wechsler scales, consistent with frontal lobe problems more prominent on the right, and the left hemisphere's relatively large size. The left temporal lobe findings were more difficult to explain given the subject's overall higher proficiency in language (Verbal IQ of 139 vs. Performance IQ of 127). (That is, the left temporal lobe is associated with

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various language functions, so compromise here would lead one to expect disturbed language).

Despite the indications of non-dominant hemispheric involvement in AS, El-Badri and Lewis (1993) present a case with central cerebral and cerebellar atrophy on the dominant side. Likewise, in their AS subject, Jones and Kerwin (1990) on CT found left temporal lobe damage. Altogether, brain imaging studies, while intriguing, do not yet confirm the neuroanatomical underpinnings of AS. Formal cognitive assessment, on the other hand, seems more consistent in supporting the notion of non-dominant hemispheric compromise.

Studies of Cognition

Several studies for instance have found Performance IQ to be significantly lower than Verbal IQ in AS. Most AS case studies report higher Verbal IQs than Performance IQs (El-Badri & Lewis, 1993; Jones & Kerwin, 1990; Volkmar et al., 1996). Likewise, Ellis, Ellis, Fraser, and Deb (1994) found a tendency in AS towards higher Verbal IQ than Visual IQ on the British Ability Scales. Volkmar, Klin, and Sparrow (1992) found in a chart review that Full Scale IQs in HFA were lower than in AS. Furthermore, in HFA, Verbal IQ was lower than Performance IQ, while in AS, the opposite pattern was true. Ozonoff, Rogers, and Pennington (1991) compared a group of children with AS to a group with HFA on a variety of measures. They found that Verbal and

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Performance IQ differed more for the HFA group than for the AS group. The AS group also tended towards significantly higher Wechsler Verbal IQs than the HFA group. Finally, within group, AS subjects tended towards slightly higher Performance IQs (mean of 94.70) than Verbal IQs (mean of 92.30). This pattern does not concord with most studies.

One study compared a group with atypical PDD, who may have met DSM-IV criteria for AS were it available at the time, to a control group of children with externalizing disorders (conduct disorders and ADHD) (Pomeroy & Friedman, 1987). On a battery of several measures (Kaufman Assessment Battery for Children (K-ABC); Beery Developmental Test of Visual-Motor Integration (VMI); Wide Range Achievement Test-Revised (WRAT-R); Dichotic Listening Test; Purdue Pegboard; Finger Localization test), the K-ABC Simultaneous Processing Scales most reliably discriminated between the PDD and control groups. The PDD group scored lower on tasks involving holistic or non-dominant cortical functioning as measured by the Simultaneous Processing Scale of the K-ABC. Their PDD group did not differ significantly from the control group on the Sequential Processing scale of the K-ABC. Broadly stated, these findings are also consistent with non-dominant hemispheric compromise.

Lincoln, Courchesne, Kilman, Elmasian, and Allen (1988) focused solely on subjects with HFA and found results that,

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broadly speaking, would not concord with non-dominant hemispheric compromise. For this group, Performance and Verbal IQ differed significantly in favor of Performance. In fact, many studies of autistic children have indicated that they usually have higher Performance than Verbal IQs (Romanczyk, Lockshin, & Navalta, 1994; Sigman, Ungerer, Mundy, & Sherman, 1987). Non-dominant hemispheric compromise has not been suggested in the literature as a possible concomitant of autism.

In some studies, AS and HFA groups did not differ on the measures used. For instance, Ghaziuddin et al. (1994) found that their measure of motor clumsiness (Bruininks-Oseretsky test) did not reliably distinguish AS subjects from HFA subjects. (However, the two groups did differ qualitatively in the manner in which movements were performed.) Szatmari et al. (1990), having administered a battery of neuropsychological and achievement tests to AS and HFA groups of children (WISC-R; WAIS-R; WRAT-R; Children's Token Test; Children's Word Finding Test; Benton Test of Facial Recognition; VMI; Wisconsin Card Sorting Test), found surprisingly few differences between the groups. The AS and HFA groups did differ from controls on all tests, especially showing weaker motor coordination, language comprehension and facial recognition. However, the AS and HFA groups only differed significantly from each other on Grooved Pegboard-non-dominant hand (HFA group performed better) and WISC-

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R Similarities (AS group performed better). Otherwise, the two groups did not differ from each other on several tests of intelligence and other cognitive functions. The mental age of the HFA group, however, was significantly higher than that of the AS group, making precise interpretations of the results difficult. Finally, using the Test of Motor Impairment-Henderson Revision, Manjiviona and Prior (1995) compared AS and HFA children. They found no significant differences between groups, although 50% of AS children and 67% of autistic children showed significant level of motor impairment.

Ghaziuddin, Leininger, and Tsai (1995) compared an AS group to an HFA group on the Rorschach, scoring by Exner criteria (Exner, 1986). AS subjects showed greater levels of primitive content than HFA subjects and (as measured by Popular contents) higher conventionality. AS subjects were also more likely to be classified as introversive, suggesting more complex inner lives with elaborate fantasies. Overall, however, the Rorschach did not differentiate the two groups on most variables.

To summarize, the findings at this point remain scant and sometimes inconsistent but suggest that those with AS tend to have lower Performance IQs than Verbal IQs. Generally speaking, this pattern is consistent with non-dominant hemispheric compromise. The opposite pattern, of higher Performance IQs than Verbal IQ's, has been suggested for HFA. Generally speaking

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again, this pattern is not consistent with non-dominant hemispheric compromise. Those with AS tend to display smaller differences between the Verbal and Performance scales than those with HFA. It is not clear at this point whether AS children necessarily are clumsier than HFA children, although both groups probably tend to be clumsier than normal controls.

The literature contains several case reports of Asperger's syndrome (El-Badri & Lewis, 1993; Carruthers & Foreman, 1989; Everall & LeCouteur, 1990; Ghaziuddin, Metler, Ghaziuddin, & Tsai, 1993; Jones & Kerwin, 1990; Kracke, 1994; McKelvey et al., 1995; Pennington, 1991; Simblett & Wilson, 1993; Volkmar et al., 1996). This report aims to: 1) complement this literature with a case of an inner-city adolescent male planning for post-secondary education; and 2) relate case material to possible right frontal disruption.

Background Information

The subject of this case report is 'Greg', a seventeen year old African American male who lives with his mother, father and eighteen year old sister in a lower socioeconomic class, inner-city neighborhood in the Northeast. (Background information, including the subject's name, has been changed to preserve anonymity, and Greg and his mother have consented to this presentation of test results.) Referred by the school guidance

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counselor, Greg originally presented for treatment for losing his temper with increasing regularity at home and school.

Developmentally, Greg was the result of a normal birth process. He spoke single words at age five and full sentences somewhat late, at age six. He did not engage in eye contact until age six. Around this time, Greg was diagnosed autistic by a local child psychiatry clinic, which provided twenty months of individual and family counseling as well as speech and language therapy. Perhaps largely due to the speech and language therapy, language development was roughly on-track again around age eight. Other milestones were reportedly in the normal range and medical history is otherwise unremarkable. Greg's father has no history of psychiatric treatment but is highly withdrawn, unemployed and might warrant psychiatric assessment. (He has never come to the clinic.) Greg's older sister, autistic and moderately mentally retarded, communicates only with sign language and attends a special program for autistic students. Greg and his mother do not have friends but spend a great deal of time together in the home and performing errands. The mother has no psychiatric treatment history but is also socially awkward and withdrawn. Based on informal assessment during collateral visits, she did not appear to meet the criteria for any type of pervasive developmental disorder.

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Public school personnel had placed Greg in classes for learning disabled students since first grade, but some of his current teachers held the informal impression that he seemed 'very intelligent' and was a 'good student'. Recently he moved into a mainstream class but met with little success and soon returned to special education. Given his characteristic clinical and historical presentation, interviews by a clinical psychologist and two psychiatrists indicated a diagnosis of Asperger's syndrome. From a DSM-IV point of view, the symptom profile was unusual in that language was reportedly delayed, but it also appeared that the mother was a questionable historian. (Prior treatment records were not available at this late date.) Furthermore, some question whether this language development criterion is really necessary (Pennington, 1991). As will be seen, the testing pattern at any rate markedly supported the diagnosis of AS.

Greg was highly interested in working with wires but wished to attend a four year college after high school and eventually become a subway transit engineer. Due to his impending graduation, his therapist referred him for cognitive assessment to measure his strengths and limitations for clinical, educational and vocational planning. At the time of testing he was in good physical health. Haldol had been prescribed, but due to the mother's resistance he did not take the medication at that

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point. Greg's social peculiarities and relatively large vocabulary, as well as contradictory impressions from his teachers, made it difficult to objectively pinpoint his cognitive and academic strengths and weaknesses. He termed himself 'retarded' but tried very hard in school.

Test Results

Greg's test scores are presented in Table One. The WAIS-R (Wechsler, 1981) Full Scale IQ was in the Borderline range (standard score of 75, 5th percentile). Greg's Verbal IQ was in the Low Average Range (standard score of 81, 10th percentile). His Performance IQ fell lower, in the Borderline range (standard score of 71, 3rd percentile). The ten point difference between his Performance and Verbal IQ scores is considerable but statistically nonsignificant, comparable to findings in the literature. Relatively low Performance IQ is also consistent with non-dominant hemispheric dysfunction.

The range of Greg's Verbal IQ subtests was fairly large, with scores from three (Arithmetic; 1st percentile) to nine (Similarities; 37th percentile). His relative strength was in the Similarities subtest, reflecting his relative ability to make associations between words and perceive and abstract common elements of them. (Szatmari et al. (1990) found this subtest to be higher in AS than in HFA.) Greg's relative verbal subtest weakness was in Arithmetic, concordant with his relatively weak

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math skills on the WRAT-III (see below). Additionally, this is the verbal subtest most reliant on visual imagery and visual memory, areas of considerable weakness for Greg.

Clinically, features of poor pragmatic use of language were readily apparent. Consistent with non-dominant hemispheric compromise, Greg was dysprosodic, with a formal style. His poor pragmatic use of language may have lowered his Verbal IQ somewhat, as he occasionally experienced difficulty explaining himself on subtests requiring longer verbal expression. That is, he had difficulty putting himself in the examiner's position to track what the examiner understood of what he was saying. Greg also experienced more difficulty with more socially-relevant verbal material. For example, on Vocabulary, he was unable to define 'compassion' and 'remorse' correctly, but accurately defined a more difficult yet emotionally neutral term, 'perimeter.'

On the Performance subtests, Greg's best nonverbal reasoning (16th percentile) was on the Object Assembly task, in which he worked within a meaningful context, synthesizing parts to a whole, albeit with a very step-by-step, trial-and-error approach. He experienced more difficulty reproducing a model on the Block Design task (9th percentile), which requires higher level analysis and synthesis of abstract visual stimuli. Relative weakness was evident in Digit Symbol (2nd percentile), due to

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visual memory weakness and motorical slowness. In fact, motorical slowness throughout the Performance IQ subtests often brought Greg's visual-manipulative scores down.

Greg also took the Raven's Standard Progressive Matrices Test (Raven, Court and Raven, 1983), in which he received a score in the Low Average Range (15th percentile). This score was considerably higher than any of his Wechsler IQ scores. This discrepancy implied he was capable of better visual-spatial reasoning when constructional elements are minimized, as on this motorically minimized visual test of nonverbal problem-solving. At least one other case study (Kracke, 1994) has reported a similar Ravens-Wechsler difference. As the literature contains no information on Raven's scores in the AS population, studies with the Ravens are needed. As the Performance IQ relies heavily on manual speed, the low Performance IQ scores in AS studies may stem from motorical slowing in AS.

Qualitatively, working with visual-manipulative material on the WAIS-R and other tests, Greg tended to associate or link individual parts of a whole, rather than respond to overall images or meanings. On Block Design, for instance, he did not appear to respond to or work from a whole image, as many do, but worked slowly piece-by-piece in trial-and-error fashion from parts to an eventual whole. Based on the modified WAIS-R administration suggested by Kaplan, Fein, Morris, and Delis

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(1991), Greg also assembled the car puzzle from the WISC-III Object Assembly test. In so doing he tended to focus on detail and match up the lines of the design for a correct, slowly-wraught solution. He did worse assembling Kaplan et al.'s circle puzzle. This circle was designed to call upon a more holistic, pattern recognition approach rather then a step-by-step, trial-and-error, detail-oriented approach. Greg did not recognize the piece as a circle and tried unsuccessfully to match edges. Greg's piecemeal processing style, evident on these and other tasks, is consistent with his overall test pattern, which implies non-dominant hemispheric weakness. Very broadly stated, the dominant hemisphere tends to focus on the details of problem solving tasks and prefers a step-by-step approach, while the non-dominant hemisphere focuses on overall patterns and global processing (Lezak, 1995; Semrud-Clikeman & Hynd, 1990).

The Wide Range Achievement Test-III (WRAT-III) (Jastak and Wilkinson, 1993) was used to assess single word reading, arithmetic and spelling. Single word reading fell in the Low Average range (23rd percentile), considerably higher than Greg's intellectual level (5th percentile as measured by the Full Scale IQ). Spelling was in the Average range (27th percentile), also high relative to his IQ-estimated aptitude. Hyperlexia has been found in autistic children (Sigman et al., 1987) but no studies have yet focused on this in AS. However, strong written language

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skills would be less consistent with dominant hemispheric compromise. Additionally, single-word reading is more of a posterior function.

Greg's WRAT-III written arithmetic skills, on the other hand, fell below the first percentile, much lower than his intelligence level predicts. This mathematical weakness is consistent with Volkmar et al. (1996) and Ozonoff et al. (1991) who also found mathematical weaknesses in their AS subjects. Although some have found good arithmetic skills in AS, mathematical weakness is also consistent in many cases with non-dominant hemispheric dysfunction (Semrud-Clikeman & Hynd, 1990).

Visual memory was also assessed, with the Benton Test of Visual Retention (Benton, 1974; Sivan, 1992). This test showed that immediate recall of abstract visual stimuli was lower than expected, with scores suggestive of disability (15 errors). On an alternative administration of Digit Symbol (Kaplan et al., 1991), wherein Greg had to remember the symbols originally associated with the numbers on the task, he could only recall the symbol associated with two numbers. These findings indicate considerable weakness in visual memory, consistent with his lowered Performance IQ as well as non-dominant hemispheric compromise.

Fine motor coordination was measured by the Purdue Pegboard Test (Tiffin, 1968), where Greg's scores were in the bottom ranks

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of the first percentile for each hand individually as well as both hands together. These low scores indicate that Greg had great difficulty making rapid, skillful movements of small objects with his fingers. Graphomotor control was also inadequate, and pencil grip was notable because of his tendency to consistently push the pencil away from himself and because of pressured writing. Visuomotor integration as measured by the VMI was at the 1st percentile. In these respects, Greg's clumsiness concords with Tantam's (1988) and others' suggestions as well as some of Ghaziuddin et al.'s (1992) findings. Fine motor problems also concord with anterior compromise. Informally assessed, design fluency and estimates of size were disrupted, as often seen in right frontal compromise.

Regarding his affective and social life, Greg's responses on the Thematic Apperception Test clearly express feelings of social rejection. For instance, to a picture of a huddled form of a boy on the floor, he created the following story, typical of his productions:

> This is a sad man. It looks like he's in jail for a crime he did not commit. He feels hurt. It looks like nobody likes him. It looks like he's been rejected a lot as a teenager. (Delay) Maybe as a teenager he wanted some love, and he couldn't find the right person. That's all I could think of now. (How does the story end?) He wanted a better life as when he was young.

Sentence Completion poignantly indicated extreme sexual interest. For instance, Greg completed "I like" with "girls who

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dress sexy". Likewise: "Most girls"--"I like dress sexy"; "My greatest worry is"--"looking for a girlfriend". Despite this sexual interest, Greg did not see himself as connecting socially with others: "People"--"I don't deal with much often". "Other kids"--"I don't pay no attention to." He did, however, see himself as academically earnest: "At school"--"I'm a hard working student." These results concord with the clinical observations of Frith (1991) that those with AS often become interested in other people in adolescence but remain awkward and realize they are excluded from social groups.

Greg also took the Rorschach Inkblot Series, which was scored according to Exner criteria (Exner, 1986). Several features of the structural summary were notable. Greg had no Human contents in his record, although one would normally expect at least three Human contents at this age. He mostly perceived animals, human details, art and landscape. Lambda was high, indicating shallow visual processing and a tendency to simplify visual stimuli. In contrast to Ghaziuddin et al.'s (1995) AS subjects, Greg was extratensive rather than introversive and had only one Popular response. This contrast may relate in part to Greg's lower IQ, as Ghaziuddin et al.'s subjects had normal IQs.

Intriguingly, and related to his lack of Human content on the Rorschach, in drawing human figures Greg only drew a face on himself (and even so, quite primitively) and not on other people.

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(See Figure One.) Although the interpretation of projective drawings is usually open to speculation, this pattern raises hypotheses along the lines that Greg felt he understood himself better than he understood others, or could not project his own experience onto others.

Thus, projective testing reveals several instances of strong sexual desire as well as a great deal of social curiosity. Greg's projective material also indicated he was aware of his difficulties with social interaction. These results concord with those of Volkmar et al. (1996), who described a 15 year old male adolescent preoccupied with the subject of a girlfriend and sexual needs, but frustrated by his social failures. In line with the suggestions of Volkmar et al., Frith (1991) and Tantam (1988), Greg does seem to have some desire to reach out to people.

Finally, Greg's adaptive functioning was assessed with the Vineland Adaptive Behavior Scales (Sparrow, Balla, and Cicchetti, 1984). As indicated by the Adaptive Behavior Composite, overall adaptive abilities fell in the bottom tenth of the first percentile. His standard score of 42 on this composite is much lower than his Full Scale IQ of 75. The three domains (Communication, Socialization and Daily Living Skills) all fell within the 'Low' range, although relative strength was evident in the Daily Living Skills domain. In their case study, Volkmar et

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al. (1996) also found marked difference between intellectual ability as measured by the IQ and adaptive ability as measured by the Vineland.

In line with non-dominant hemispheric weakness, Greg's cognitive deficits appeared to limit his social sensitivity in several ways. He missed the interpersonal nuances within social interactions, had difficulty applying his relatively good verbal conceptual ability to solving problems in the social realms, and experienced difficulty assuming a flexible approach in novel situations. (The non-dominant hemisphere is more adept with novel information.) Processing of all situations, including social, was piecemeal rather than simultaneous and holistic. Greg also experienced difficulty interpreting nonverbal social cues, and missed humor implicit in social interaction necessary for social judgment.

Recommendations

Altogether, Greg's test results were consistent with AS and with right frontal compromise. Applying this knowledge to vocational recommendations, it was suggested that Greg could best work where he had limited social contact, made few or no decisions, worked at a slow pace and did not need arithmetic skills. While taking his visual-manipulative limitations into account, it seemed more important vis-a-vis vocational recommendations to consider his social limitations. In other

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words, vocational recommendations were based more on what Greg could and could not do socially as well as his affinity for trains, and secondarily on what he could and could not do manipulatively. Thus, he was encouraged to work towards becoming a train mechanics' assistant even though it relies relatively more on psychomotor tasks than do many other fields. This field would also capitalize upon his interest in machines but with a more realistic scope than engineer.

Had Greg not been so far along in high school, occupational therapy in his school district would have been recommended to remediate his motor deficits. In the work place and in school, it was recommended that Greg be taught by verbal means in a rote and explicit, step-by-step sequenced fashion, using a parts-to-whole verbal instruction approach (Klin, 1994). It was also suggested that in addition to teaching concepts and skills through verbal means, Greg should be taught and encouraged to use verbal compensatory strategies. As with non-verbal learning disorder, it was stressed that for novel tasks and learning, Greg needed step-by-step monitoring, repetition and practice (Rourke, 1989). Although the focus was often on Greg's relative strength in language, it was emphasized that teachers be made aware of Greg's cognitive limitations, as their overestimation of his capacities could be counterproductive. In addition, given his predilection for machines and his mathematical weaknesses, the

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examiners recommended that he receive and learn how to use a calculator.

Clinically, the examiners recommended a more cognitive approach to psychotherapy, focusing on taking advantage of Greg's relative strengths in vocabulary to label affects and describe social situations. Teaching specific problem-solving strategies, especially related to everyday social situations, was suggested. As part of this approach, the therapist could role-play social situations that require Greg to rely on his weaker nonverbal skills (Rourke, 1989). It was also suggested that the therapist provide feedback to Greg regarding his capabilities, including those situations which are easy for him and those which are potentially troublesome for him (Rourke, 1989). It was also recommended that Greg's family consider adopting a pet cat or dog for physical contact.

Conclusions

At this point, more is known about autism than about AS. The demographics of this group remain relatively open to speculation (Gillberg and Gillberg, 1989). This seems especially true for the lower socioeconomic classes. Furthermore, in terms of clinical and support services, people with AS tend to 'fall between the cracks,' as they are not classically learning disabled and not classically autistic. School psychologists should especially be vigilant for AS as they are in a unique

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position to identify, assess and support these students (Gross, 1994).

The question of hyperlexia of some AS patients also deserves exploration, especially as it relates to their higher verbal ability, and, in likelihood for many cases, their relatively intact dominant hemispheres. Studies of nonverbal intelligence on tests with minimized motorical elements, such as the Ravens, might also prove useful for this population, given their motorical slowing. Further research is also needed on how psychometric patterns, as opposed to diagnostic clinical criteria, distinguish AS from HFA. It would also be useful to have better normed measures of social/emotional awareness (i.e., facial emotion recognition). The field also needs more research on the practical, clinical implications of diagnosis of AS over HFA. Given the current lack of clear implications of its distinction from HFA, and the current lack of firm results from brain imaging, individual cognitive and psychometric assessment remains especially important in AS.

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Table 1. Test Scores

TEST (Score)	PERCENTILE RANK
WAIS-R	
Verbal (81)	10
Performance (71)	3
Full Scale (75)	5
Information (5)	5
Similarities (9)	37
Arithmetic (3)	1
Vocabulary (6)	9
Comprehension (6)	9
Digit Span (6)	9
Picture Completion (5)	5
Digit Symbol (4)	2
Picture Arrangement (5)	5
Block Design (6)	9
Object Assembly (7)	16
RAVEN'S STANDARD PROGRESSIVE MATRICES	15
WIDE RANGE ACHIEVEMENT TEST-3	
Reading	23
Spelling	27
Arithmetic	0.2
BENTON TEST OF VISUAL RETENTION	
Administration A (correct=3)	n/a

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	(error=15)	n/a
BEERY TEST OF		
VISUAL MOTOR INTEGRATION	(67)	1
PURDUE PEGBOARD TEST		
Dominant Hand (right)	(10)	<1
Non-dominant Hand (left)	(8)	<1
Both Hands	(25)	<1
VINELAND		
Communication Domain	(48)	<0.1
Daily Living Skills Domain	(64)	1
Socialization Domain	(25)	<0.1
Adaptive Behavior Composite	(42)	<0.1

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Male

Female

Self

Figure One. Draw-A-Person-Test

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Authors' Note

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